



Overview of People's Liberation Army Air Force "Elite Pilots"

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Preface

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More than two decades ago, the armed forces of the People's Republic of China embarked on a series of efforts to transform from a massive, low-tech force focused on territorial defense to a leaner, high-tech force capable of projecting power and influence around the peripheries of the nation, even against the expeditionary forces of the most capable adversary. By developing operational strategies tailored to meeting this objective; reforming the organization, training, and doctrine of the armed forces; and, perhaps most importantly, making large and sustained investments in new classes of weapon systems, China may be on the cusp of realizing the ambitious goals it has laid out for its armed forces. Without doubt, China's air and maritime forces today field capabilities that are compelling U.S. military planners to rethink their approach to power projection and to reorient important components of their modernization programs. China, in short, has become the "pacing threat" for the U.S. Air Force and Navy. As such, the importance of understanding the capabilities and limitations of China's air, naval, and space forces is self-evident. The mission of CASI is to contribute to that understanding.

CASI's research team brings to this work a mastery of research methods, understanding of China's military capabilities and doctrine, and the ability to read and understand Chinese writings. When undertaking research for CASI reports, analysts used a variety of Chinese-language primary-source documents on PLA Army and PLAAF training, operations and doctrine. This includes *Kongjun Bao* (Air Force News) and *Huojianbing Bao* (Rocket Force News)—the daily newspapers of the PLAAF and PLA strategic missile forces—as well as defense white papers, PLA encyclopedias, and books by military officers and academics affiliated with the PLA (such as the Academy of Military Science). These publications are considered authoritative assessments and reporting on training, strategy, and concepts for how

the PLAAF and missile forces prepare for military operations and warfare in general. It is important to acknowledge, however, that these PLA publications also have some weaknesses, and that reliance on open sources necessarily has some limitations. The growing availability of primary-source material helps to compensate for at least some of these challenges.

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Summary

This report draws on a wide variety of Chinese primary sources to provide an overview of how the Chinese People's Liberation Army Air Force (PLAAF) selects and trains what it calls its *elite fighter pilots* (尖子飞行员). To date, the PLAAF has identified three groups of pilots as *elite pilots*. The first group comprises 33 pilots who have won the annual Golden Helmet (金头盔) competition at the Dingxin Test and Training Base in Gansu province since 2011; Chinese military media reports describe the Golden Helmet as “the supreme contest among Chinese fighter pilots.” The second group comprises pilots who belong to the PLAAF's Bayi (also called August 1st) Aerobatics Team (八一飞行表演队), which was created in 1962 and has used the J-10 multirole aircraft since 2009. The third group comprises six Su-30 attack pilots, including one Golden Helmet winner, who competed in Russia's Aviadarts 2014 competition for the first time. While each of the three groups compete using existing flight procedures, the lessons learned are reviewed extensively for ways to change existing tactics and combat methods. For example, one of the most important lessons learned has been the PLAAF's desire to move toward less scripted training, which Chinese sources typically refer to as *ziyou kongzhan* (自由空战) and translates as “unrestricted air combat” or “free air combat” training. Additionally, official Chinese media reports on the PLAAF's Golden Helmet competition, its participation in the Russian Aviadarts competition, and the Bayi Aerobatics Team's participation in air shows in Russia in 2013 and Malaysia in 2015 appear to reflect a desire on the part of the PLAAF to project a more open and confident image at home and abroad. Finally, in 2014, the PLAAF implemented a Golden Dart competition to identify elite ground attack and bomber crews.

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Abbreviations

BVR	beyond visual range
CASI	China Aerospace Studies Institute
FTTB	Flight Test and Training Base
IFR	instrument flight rules
MR	military region
MRAF	Military Region Air Force
OMTE	Outline of Military Training and Evaluation
OPFOR	opposition force
PAF	Project AIR FORCE
PLA	People's Liberation Army
PLAAF	People's Liberation Army Air Force
SAM	surface-to-air missile

1. Introduction

The Chinese People's Liberation Army Air Force (PLAAF) is undergoing an impressive and wide-ranging modernization program designed to make it a more technologically advanced, professional, and operationally capable service capable of protecting and advancing Chinese interests in the Asia-Pacific region and beyond.¹ This report seeks to illuminate an important aspect of this transformation by providing an overview of how the PLAAF designates its *elite fighter pilots* (尖子飞行员).²

To date, the PLAAF has identified three groups of pilots as *elite pilots*.³ The first group comprises 33 pilots who have won the annual Golden Helmet (金头盔) competition at Dingxin since 2011; Chinese military media reports describe the Golden Helmet as “the supreme contest among Chinese fighter pilots.”⁴ The second group comprises pilots who belong to the PLAAF's Bayi (August 1)⁵ Aerobatics Team (八一飞行表演队), which was created in 1962 and has used the J-10 multirole aircraft since 2009. The third group comprises six Su-30 attack pilots, including one Golden Helmet winner, who competed in Russia's Aviadarts 2014 competition for the first time. Additionally, Chinese official media reports on the PLAAF's Golden Helmet competition, its participation in the Russian Aviadarts competition, and the Bayi Aerobatics Team's participation in air shows in Russia in 2013 and Malaysia in 2015 appear to reflect a

¹ For broader assessments of PLAAF modernization over the years, see, for example, Richard P. Hallion, Roger Cliff, and Phillip C. Saunders, *The Chinese Air Force: Evolving Concepts, Roles, and Capabilities*, Fort McNair, Washington, D.C.: National Defense University, 2012; National Air and Space Intelligence Center, *People's Liberation Army Air Force 2010*, Wright-Patterson Air Force Base, Ohio: National Air and Space Intelligence Center, August 1, 2010; Roger Cliff, John F. Fei, Jeff Hagen, Elizabeth Hague, Eric Heginbotham, and John Stillion, *Shaking the Heavens and Splitting the Earth: Chinese Air Force Employment Concepts in the 21st Century*, Santa Monica, Calif.: RAND Corporation, MG-915-AF, 2010; and Kenneth W. Allen, Glenn Krumeel, and Jonathan D. Pollack, *China's Air Force Enters the 21st Century*, Santa Monica, Calif.: RAND Corporation, MR-580-AF, 1995.

² Multiple People's Liberation Army (PLA) and PLAAF articles in Chinese refer to PLAAF *jianzi feixingyuan* (尖子飞行员); however, no authoritative PLA English-language article provided a good translation or a clear definition of this term. Various dictionaries translate the term *jianzi* (尖子) as “the best,” “top,” “pick of the bunch,” “cream of the crop,” and “outstanding.” In addition, certain Western media reports have translated the term *jianzi feixingyuan* (尖子飞行员) as “ace pilot”; however, for purposes of this paper, the term *elite pilot* is used.

³ For an example of a report that highlights what appears to be the PLAAF's desired image of greater openness and confidence, see Dong Zhaohui, ed., “Feature: Pilots of New Generation in PLA Air Force,” *China Military Online*, December 29, 2014. The report profiles two younger-generation PLAAF fighter pilots. The first is Tang Zheng, born in 1981 and nicknamed “Fatty.” Tang is part of a J-10 regiment that took first-place honors in the team portion of the 2014 Golden Helmet competition. In addition, Tang achieved a second-place finish in the individual contest, falling behind the winner by a single point. The second pilot profiled in the story is Xu Hu, who was also born in the 1980s and is nicknamed “Tiger.”

⁴ “Golden Helmet” [“金头盔”], *China Armed Forces* [中国军队], Vol. 19, No. 1, February 28, 2013, pp. 20–21.

⁵ The PLAAF aerobatics team is named August 1st, after China's Army Day, which commemorates the establishment of the PLA on August 1, 1927.

desire on the part of the PLAAF to project a more open and confident image at home and abroad. In addition to the *elite pilots*, the PLAAF selected 25 “outstanding aviators” (优秀飞行人员/优秀飞行员) for 2013 and 2014, including at least one of the Golden Helmet winners.⁶

While the Golden Helmets and Aviadarts participants compete using existing flight procedures, the lessons learned are reviewed extensively for ways to change the existing tactics and combat methods. For example, one of the most important lessons learned has been the PLAAF’s desire to move toward less scripted training, which Chinese sources typically refer to as *ziyou kongzhan* (自由空战) and translates as “unrestricted air combat” or “free air combat” training.⁷ In addition, two other primary goals for the Golden Helmet competitions are to increase the number of units participating and to have young pilots compete, since the PLAAF sees them as less reluctant to deviate from a follow-the-plan mindset than older pilots, who grew up in the system of highly scripted training and greater concern for flight safety.

A fourth group that might seem to be conspicuous by its absence from the list of *elite pilots* consists of China’s astronauts, often referred to as *taikonauts*.⁸ As a point of comparison, in the U.S. space program, the Mercury 7 astronauts were all military test pilots.⁹ Although China’s astronauts have not been singled out as *elite pilots*, all were outstanding PLAAF pilots. As of April 2016, ten astronauts, two of whom are women, have traveled to space as part of the Shenzhou program.¹⁰ In 2003, Yang Liwei was launched aboard Shenzhou 5, becoming the first person sent into space by the Chinese space program. During the Shenzhou 7 mission in 2008, Zhai Zhigang became the first Chinese to carry out a spacewalk. In 2012, Liu Yang became the first Chinese woman to be launched into space when she was launched aboard Shenzhou 9.

The first group of 14 males were selected for the 2003 mission, all of whom had at least 1,000 flight hours.¹¹ In 2009, China began a new round of astronaut selection in 2009 for the 2012 mission by selecting 45 astronaut candidates, including its first women hopefuls.¹² The 30 male and 15 female candidates were part of a program to pick five men and two women astronauts to participate in manned missions planned before 2012. Like previous astronauts, all

⁶ Only one pilot, Tian Ye [田野], who is currently the commander of a Guangzhou Military Region Air Force (MRAF) Air Regiment, was identified. See “A Sketch of 2013–2014 Air Force Outstanding Aviator Representatives” [“二〇一三至二〇一四年度空军优秀飞行人员代表剪影”], *Kongjun Bao*, February 26, 2015, p. 3; and Tian Ye [田野], “Outstanding Aviator Standard: Fighting for Victory to Lead the Pack” [“优秀飞行员的标准:争做敢打必胜的领头雁”], *Kongjun Bao*, February 26, 2015, p. 3.

⁷ For purposes of this paper, *free air combat* will be used.

⁸ The name comes from the Chinese word for space, *taikong*.

⁹ The Mercury 7 were Naval aviators M. Scott Carpenter, Walter M. Schirra Jr., and Alan B. Shepard Jr.; Air Force pilots L. Gordon Cooper Jr., Virgil I. (Gus) Grissom, and Donald K. (Deke) Slayton; and Marine Corps aviator John H. Glenn Jr. See Sarah Loff, “The Mercury Astronauts,” NASA.gov, July 30, 2015.

¹⁰ See “Facts and Figures on China’s Space Programs,” Xinhua, April 22, 2016.

¹¹ *Kongjun Bao*, February 22, 2003, p. 2.

¹² Kevin Pollpeter, “China’s Space Industry in 2009: A Year in Review,” *Study of Innovation and Technology in China*, policy brief 10, September 2010.

45 candidates were PLAAF pilots between the ages of 27 and 34. All male candidates were fighter pilots, all female candidates were transport pilots, and all had at least a college degree.¹³

Sources

This report draws on a wide variety of Chinese primary sources, including official PLA media reports, which provide many types of useful information about topics such as strategy, doctrine, personnel, education, and training. For researchers interested in Chinese air and space power issues, one particularly valuable source is the official PLAAF newspaper, *Kongjun Bao* (空军报), which also carries the official English name of *Air Force News* on the cover. The paper was established in 1957 and, since January 2012, has been published five days a week. The newspaper covers nearly every key issue, including leadership meetings and guidance, organizational structure, personnel, foreign military relations, education, training, and logistics and maintenance. The content discusses both shortfalls and successes. Although the publication does not discuss weapons capabilities or provide true unit designators, it is considered a reliable source for examining a variety of PLAAF-related issues. Another valuable source is *China Air Force* (中国空军) magazine, which was first published in 1986 by the PLAAF Political Department. Until the mid-1990s, the periodical dealt mostly with the PLAAF's organizational and combat history. Around 1995, the focus shifted to current activities but also still covers some historical issues.

It is important to acknowledge that official military media sources such as these and other PLA publications have both strengths (such as offering authoritative descriptions and assessments of a number of important topics) and weaknesses (such as gaps in coverage of other topics of interest). In addition, a completely open-source report necessarily has some limitations, but the growing availability of primary-source material helps to compensate for at least some of the challenges facing researchers in this area.

Organization of the Report

The remainder of the report is organized as follows. Chapter Two briefly describes the PLAAF's Cangzhou/Cangxian and Dingxin Test and Training Bases. Chapter Three describes the PLAAF's Golden Helmet competition. Chapter Four describes PLAAF participation in the international Aviadarts 2014 competition and the Bayi Aerobatics Team's participation in international air shows. It also discusses the PLAAF's new Golden Dart ground attack and bombing competition. Chapter Five recaps the key findings and highlights some key unanswered questions.

¹³ "China Picks First Female Astronaut Candidates," ABC News, September 17, 2009.

2. The PLAAF's Cangzhou and Dingxin Test and Training Bases

This chapter describes aspects of the PLAAF's Cangzhou/Cangxian and Dingxin Test and Training Bases, which are relevant to the development and training of *elite pilots*. Cangzhou is particularly noteworthy as the home of the PLAAF's blue force unit, while Dingxin serves as the venue for the PLAAF's annual Golden Helmet competition.

Cangzhou Test and Training Base

The Cangzhou (沧州) Flight Test and Training Base (FTTB) (飞行试验训练基地), which is also called a *Flight Test and Training Center* (飞行试验训练中心), is located in Hebei province. It was officially established in 1987.¹⁴ Although the base was initially constructed in 1953, the facility spent its first few decades evolving and expanding to reflect Chinese military modernization. In the late 1980s and early 1990s, the base solidified its role as the facility for elite pilot training.¹⁵ Particularly noteworthy is that Cangzhou is home to the PLAAF's first blue force unit, which is equipped with J-10 fighters and plays the role of the enemy air force in PLAAF training. While Western militaries traditionally train against a unit or collection of units that plays the role of the opposition force (OPFOR) and labels these OPFOR elements the *red force* (红军), the Chinese OPFOR is known as the *blue force* (蓝军). Reportedly, the unit motto is “think and fly like the enemy” (“像敌人那样思考和飞行”).¹⁶ According to one *PLA Daily* article, the PLAAF's J-10 blue force plays the role of a realistic simulated opponent in “free air combat training,” thus helping address the problem of PLAAF units “training against an invisible opponent and fighting in an unrealistic environment.”¹⁷ According to the commander of the base, the involvement of the J-10 blue force unit allows pilots on both sides of OPFOR exercises to engage in “free air combat” training that will better prepare them for future aerial battlefields.¹⁸ Reportedly, PLAAF blue force training simulated Soviet Union air force units at first, and the

¹⁴ The base was established in Cangzhou, Hebei province, on February 3, 1987, replacing the 11th Aviation College. See Kenneth W. Allen, *People's Republic of China People's Liberation Army Air Force*, Washington D.C.: Defense Intelligence Agency, May 1991, section 20. Former U.S. Air Force Chief of Staff General Larry Welch led a delegation on a visit to the center in April 1989. It is often merely identified as a *training base* (训练基地) and sometimes as the *North China Test and Training Base* (华北试训基地).

¹⁵ “Air Force Flight Test and Training Base Development History” [“空军飞行试验训练基地发展简史”], PLAAF.net, January 7, 2008.

¹⁶ “Come Fly, My Combat Aircraft!” [“飞起来吧，我的战机!”], *PLA Daily* [解放军报], November 12, 2012.

¹⁷ Zhang Li and Huang Ziyue, “The First Special Duty J-10 ‘Blue Force’ Gives an Extraordinary Performance,” *PLA Daily* [解放军报], October 20, 2012.

¹⁸ Zhang Li and Huang Ziyue, 2012.

OPFOR elements later switched to playing the roles of Taiwan and the United States as the simulated adversaries.¹⁹

In addition to providing realistic training via OPFOR units, Cangzhou's Test and Training Base gives the PLAAF a venue for developing modern air combat tactics. PLA media reports indicate that Cangzhou FTTB is responsible for development of tactics and techniques, training programs, and certification of new equipment. Specifically, Cangzhou is where the PLAAF further develops tactics that originate on paper at the PLA Air Force Command College. Although exact documentation of this process is scant, it seems that Cangzhou's blue force OPFOR training units may have the responsibility for translating top-down, doctrinal guidance into air-combat tactics.²⁰

Additionally, the testing component of Cangzhou's mission also refers to testing one final prototype of all new fighter aircraft models before they are approved for delivery from the factory to an operational unit. At some point during the testing phase, one prototype is sent to the Xi'an Yanliang Airfield, where the PLAAF's main test-flight unit is located (the factory test-flight units are subordinate to this unit). The aircraft is usually then sent to the PLAAF's Flight Test and Training Base at Cangzhou near Tianjin, where it is tested for tactics capabilities.²¹

Dingxin Test and Training Base

The PLAAF's other training facility, Dingxin Test and Training Base, is located on the opposite end of the country from Cangzhou (Figure 2.1). Situated in northwestern Gansu province, the Dingxin Test and Training Base gives PLAAF pilots a much larger operating area. For example, the PLAAF has reportedly constructed mockups of Taiwan military facilities at Dingxin to enable practice runs against intended targets. Specifically, Taiwan media reports indicate that China has built a mock airfield near Dingxin that appears to be nearly identical to the Taiwan Air Force's Chingchuankang airbase in central Taiwan.²² The large training areas available at Dingxin thus give the PLAAF unique opportunities to develop proficiency in the strategies and tactics initially developed at Cangzhou. What advanced units can work through experimentally at

¹⁹ Kenneth W. Allen, "PLA Air Force Operations and Modernization," in Susan M. Puska, ed., *People's Liberation Army After Next*, Carlisle, Pa.: U.S. Army War College, Strategic Studies Institute, 2000, pp. 189–254.

²⁰ "Come Fly, My Combat Aircraft!" ["飞起来吧，我的战机!"], 2012.

²¹ PLAAF pilots have been the ones to test fly almost all new combat aircraft at the factories, as illustrated by the examples of the J-7 and J-10. Each factory has what is called a *test-flight station* (试飞站), which is run by the factory civilians and has at least three maintenance groups manned by civilians. The PLAAF has a test-flight regiment (试飞团), which was formed in 1973 and is assigned to Xi'an Yanliang airfield, where test flights are conducted on one of the later prototypes. It has to pass through that stage of testing and be approved each step along the way by a design finalization committee (定型委员会). The PLAAF has at least six test-flight groups (试飞大队), each of which are small (battalion size) but are regiment-grade units, assigned to the aircraft factories as follows: Shenyang (1st group), Harbin (2nd group), Chengdu (3rd group), Hongdu (4th group), Anshun (5th group), and Chenggu (6th group).

²² Allen, 2000, p. 213.

Cangzhou can be practiced until perfection at Dingxin and its supporting facilities. Besides serving as a test and training area for aircraft, Dingxin has a separate area for testing surface-to-air missiles (SAMs). In addition, Dingxin is home to the Golden Helmet competition.

Figure 2.1. Locations of Dingxin and Cangzhou FTTBs



This difference in size and location is a key distinction between the two PLAAF advanced training bases. Dingxin is located a significant distance from population centers, giving PLAAF pilots the opportunity to benefit from live-fire ranges and the ability to train under actual electromagnetic jamming conditions. Conversely, Cangzhou allows pilots to conduct test and training in the appropriate flight zones over the Bohai Gulf, which is becoming even more relevant as the PLAAF expands its maritime reach. The two facilities can thus be seen as complementary, and this arrangement allows for advanced pilots at Cangzhou to work to translate new, theoretical guidance on tactics into operational tactics, techniques, and procedures. Given the distance of Dingxin, the PLAAF can give its pilots training opportunities to practice new tactics and combat methods. In addition, the large Dingxin facility offers space for large exercises, including the PLAAF's annual Red Sword/Blue Sword exercise, which aims to prepare the PLAAF for the possibility of future high-technology combat against highly capable adversaries.²³

²³ David Axe, "China's Increasingly Good Mock Air Battles Prep Pilots for Real War," *Wired*, February 7, 2013.

PLAAF *Tactics and Combat Methods*

The PLAAF has different development and training processes for what it calls *tactics* (战术) and *combat methods* or *methods of combat* (战法/战斗方法). The *Air Force Dictionary* defines tactics as

the principles and methods an air force uses to conduct battles, to include deployment, command, coordination, battle activity methods, and battle support. The contents include full preparation, active initiative, consolidated application, complete coordination, flexibility and mobility, strike from concealment, and close defense.²⁴

Neither the *Air Force Dictionary*, *Air Force Encyclopedia*, nor *PLA Military Terminology* have an entry for the term *combat methods*; however, the *Air Force Dictionary* has an entry for *Methods of Aviation Combat Activities*, which appears to be the long form for *combat methods*. *A Chinese-English Dictionary of Military Technology Terms* has an entry for *methods of combat*.²⁵ Notably, however, the *Air Force Encyclopedia* lumps the two concepts together and merely calls them *tactics* for the sake of simplicity.²⁶

As a general rule, the PLAAF Command College in Beijing develops fighter tactics on paper, which are then further developed in the air at the Cangzhou/Cangxian Test and Training Base (行试验训练基地) in Hebei province near Tianjin.²⁷ The PLAAF tasks operational air units to develop combat methods using a seven-step process that begins at the operational unit and ends with testing and approval at the Dingxin Test and Training Base in Gansu province.²⁸ In both

²⁴ See “Tactics of Air Force” [“空军战术学”] in Zhu Rongchang, ed., *Air Force Dictionary* [《空军大辞典》], Shanghai: Shanghai Dictionary Publishing House, September 1996, p. 23.

²⁵ See “Methods of Aviation Combat Activities” [“航空兵战斗活动方法”], in Zhu Rongchang, ed., *PLA Military Terminology* [《中国人民解放军军语》], Beijing, China: Academy of Military Science Press, December 2011, p. 24. *A Chinese-English Dictionary of Military Technology Terms* [《汉英军事技术大辞典》], Beijing, China: Xuefan Press, July 2004, p. 1651.

²⁶ Wu Chunfa, “Air Force Tactical Training,” in Yao Wei, ed., *China Air Force Encyclopedia* [《中国空军百科全书》], Beijing, China: Aviation Industry Press, November 2005, p. 293–294.

²⁷ Given some of the confusion found in the Western press about the name of this facility, it seems useful to note that Cangzhou is a prefecture-level city (地级市). Prefecture-level cities are administrative regions that include both the city itself as well as what could be considered the suburban and rural surroundings of that city. Accordingly, sometimes the Test and Training Base is listed as being in Cangzhou (沧州, “Cang Prefecture”), Cangzhoushi (沧州市, “Cang Prefecture City”) and sometimes is listed as being in Cangxian (沧县, “Cang County”). For purposes of this report, only Cangzhou will be used.

²⁸ The PLAAF has a tactics-development research office in its Command College, the Cangzhou Test and Training Base, and the Dingxin Test and Training Base. However, Headquarters PLAAF has tasked specific operational aviation, SAMs, and radar units to develop certain tactics and combat methods. For example, the 2nd Air Division’s 2nd Flying Group at Suixi, Guangzhou MRAF, was tasked in 2000 to develop combat methods against cruise missiles. When this happens, the unit is identified as a *test point* (shidian, 试点). See Kenneth Allen, “Tactics and Combat Methods,” unpublished paper, 2006. Based on analysis of articles concerning combat methods for the PLAAF, Navy, and Second Artillery over the past 15 years, the seven steps for the PLAAF appear to be as follows: (1) study the theory; (2) begin developing the concepts on paper and receive theoretical evaluation approval for

cases, once the *tactics* and *combat methods* are developed and approved, the PLAAF then writes regulations that everyone must use to train at their operational unit. Each process takes at least one year and may last several years. Once the regulations are written, any changes require starting the entire process over again. Unfortunately, no sources were found that clearly identify the difference between *tactics* and *combat methods*; however, air-to-air engagements are considered *tactics*, which includes flying at night and flying in clouds, while shooting down cruise missiles is considered a *combat method*.

them; (3) move the theory to real equipment to develop and revise the concepts; (4) test the concepts at a test base or at sea; (5) receive a technical evaluation and approval for the new methods; (6) PLAAF Headquarters authorizes them for use throughout the force, writes the regulations, and incorporates them into the training plan; and (7) demonstrate the methods to VIPs and the rest of the force.

3. The PLAAF's Golden Helmet Competition

The PLAAF established the Golden Helmet air-to-air combat competition in 2011 to “improve and assess pilots’ skills and capabilities in combat conditions.” In some ways, the Golden Helmet competition is reminiscent of the U.S. Air Force’s air-to-air competition, William Tell, which was flown from 1954 to 1996 and again in 2004.²⁹ It is unclear whether Golden Helmet is patterned after this competition, but it is clearly emerging as a high-profile event for the PLAAF. Indeed, according to a report in *China Armed Forces*, the Golden Helmet competition is the “supreme contest among Chinese fighter pilots.”³⁰ The individual winners of the annual competition receive the Golden Helmet award, which “recognizes a pilot’s skills and tactical proficiency,” as well as the right to wear a gold-colored helmet on duty.³¹ Even their individual aircraft has the Golden Helmet logo on it. Another official PLA media report states that the Golden Helmet contest “represents the highest level of PLAAF’s air confrontation training, and winning the Golden Helmet is the highest honor for any PLAAF fighter pilot.”³² To date, 33 PLAAF pilots have won Golden Helmets, including three Chinese pilots who are reported to have won the award twice: Yan Feng (2012 and 2014), Jiang Jiayi (2011 and 2012), and Xu Liqiang (2012 and 2013). There is also a unit award, which is given to the team with the highest total score. Additionally, some pilots who do not win the Golden Helmet award receive other forms of special recognition. Specifically, besides the Golden Helmet winners, three other awards are given out, including awards for units, individual pilots, and ground guidance personnel.³³

The Golden Helmet competition reflects China’s desire to move toward less scripted “free air combat” training. Chinese military media reports note that, historically, China’s air combat training practices “could not match actual combat (实战) conditions,”³⁴ whereas the air forces of many other countries were already engaging in much more realistic “free air combat” training. In 2009, China proposed to address this problem by adopting “free air combat” training, and, in 2010, it initiated some new pilot training programs. By 2011, according to one report, “free air

²⁹ On the 2004 William Tell competition, see, for example, Bill Kaczor, “Fighter Tactics, Pilots Put to the Test: William Tell Competition Showcases the Future of Aerial Combat,” *Herald-Tribune*, November 20, 2004.

³⁰ “Golden Helmet” [“金头盔”], 2013.

³¹ “Golden Helmet” [“金头盔”], 2013.

³² Dong Zhaohui, 2014.

³³ Liu Andong [刘安东], Zhang Li [张力], Yan Guoyou [闫国有], and Li Kaiqiang [李开强], “What Is the Meaning of ‘Golden Helmet’ in the End” [“‘金头盔’的涵义到底是什么”], *PLA Daily* [解放军报], January 2, 2014, p. 5.

³⁴ Xu Tongxuan, “Unrestricted Air Combat—The Second Golden Helmet Awards,” *China Armed Forces* [中国军队], Vol. 19, No. 1, February 28, 2013, p. 28.

combat training and contests were extended to all air force units.”³⁵ One key issue closely related to “free air combat” training is flight safety, as the PLA AF had to relax its safety standards following the issuance of the 2002 Outline of Military Training and Evaluation (OMTE) (军事训练与考核大纲) in order to meet its requirements for more realistic training.³⁶

Golden Helmet 2011

In November 2011, China held its first Golden Helmet competition and awarded the Golden Helmet to ten pilots out of approximately 100 competitors from about 14 regiments.³⁷ The types of aircraft involved in this inaugural competition reportedly included J-10s, J-11s, and Su-30s.³⁸ Although this first Golden Helmet competition marked progress, reportedly helping the PLA AF move beyond highly scripted, unrealistic training scenarios, there were still some shortcomings to be addressed. For example, the first Golden Helmet contest reportedly did not incorporate competition between different types of aircraft. Such training, usually referred to as dissimilar combat training, is considered more realistic than competition between similar fighters, as pilots must be prepared to fight against other types of aircraft in actual combat. Notably, almost no information was available about the 2011 competition until the 2012 competition occurred. Furthermore, this is a competition, where pilots use what they have already learned. It is not a *training* event per se; however, based on feedback from the participants, changes can be made through the proper process to change training at operational units.

³⁵ Xu Tongxuan, 2013, p. 28.

³⁶ The latest OMTE went into effect in January 2009. The first three versions that existed between 1955 and 1989 covered all services and branches in a single document. The 1989 version was the first time it was divided into training outlines for the Army, Navy, Air Force, and Second Artillery. A new version was issued in 2002, which, for the first time, included the word *evaluation*. Each outline is divided into separate volumes according to different objectives and levels. Each volume is further divided into several subsections by organization or specialty. Since 2002, the General Staff Department has been responsible for issuing the Army OMTE, the PLA Navy for its OMTE, the PLA AF for its OMTE, and Second Artillery for its OMTE. According to the *PLA Air Force Dictionary*, the OMTE is the general guide for PLA AF training. The outline includes training goals, principles, content, implementation phases and procedures, timing, methods, and quality-control inspection procedures. It is divided into several categories, including training for command personnel, headquarters department, branches (aviation, anti-aircraft artillery [AAA], SAM, airborne, and radar), and all support subunits, such as the communications troops. The new 2002 OMTE had significant changes in the areas of guiding concepts, training content, the training organizational structure, and the model of support. It took several years to revise the previous plan and to approve the new plan. *Contemporary Military Officer Encyclopedia-Dictionary* (*Dangdai Junguan Baike Cidian*, 当代军官百科全书), Yang Changlin, ed., Beijing, China: PLA Publishing House, July 1997, p. 92. This dictionary does not have an English translation for *outline*. The PLA’s *Military Encyclopedia* published in 1997 does not have an entry for *outline*. *Air Force Dictionary* (*Kongjun Da Cidian*, 空军大词典), Zhu Rongchang, ed., Shanghai, China: Shanghai Dictionary Publishing House, September 1996, p. 180.

³⁷ Notably, the 2011 competition involved regiments only because the PLA AF did not create brigades until 2012.

³⁸ “PLA Pilots Vie for Coveted ‘Golden Helmet’ in Largest Ever Air Drills,” *Want China Times* (in English), September 17, 2014.

Golden Helmet 2012

China held the second Golden Helmet competition in November 2012. There were 11 winners among the 108 pilots who participated from 14 regiments and brigades. There were also some improvements compared with the first competition the previous year. According to PLA media reports, in contrast to the first Golden Helmet competition, the second featured two categories: competition between similar types of aircraft and competition between different types of fighters.³⁹ In addition to competition between different aircraft types, the 2012 competition also introduced “two-on-two” confrontations. The second competition also reduced safe distance between aircraft in free air combat and added “face-to-face peer reviews of pilots’ performances.”⁴⁰ One PLA media report described the rules as follows:

at the start of each round, two fighter jets flew to the destination at different altitudes following instructions from their respective headquarters on the ground. When the aircraft reached the combat zone, both sides stopped issuing instructions and they entered into close-range free combat using their own fighting positions and tactics.

Each round of the competition lasted about two minutes, and “the live combat was transmitted to command posts at different levels of the air force.”⁴¹ According to one evaluation,

the free air combat training helped establish a new training model and improve pilots’ capabilities. However, it also revealed a disparity between the Chinese and some foreign air forces, especially in terms of tactics.⁴²

Golden Helmet 2013

The third Golden Helmet competition was held over ten days in November 2013. There were nine winners out of 128 participants from 14 regiments and brigades, and about 60 percent of the pilots were participating in the competition for the first time. The competition reportedly included beyond visual range (BVR) engagements, close-range dogfights, competitions between similar and dissimilar types of aircraft, and “electromagnetic confrontation.”⁴³ According to one PLA media report, the competition was not just a tournament, but also a platform for improving pilots’ skills and broadening their outlooks. Consequently, the report concluded, the competition embodies the “essence of realistic combat training.”⁴⁴

³⁹ Xu Tongxuan, 2013, p. 28.

⁴⁰ Xu Tongxuan, 2013, p. 28.

⁴¹ Xu Tongxuan, 2013, p. 29.

⁴² Xu Tongxuan, 2013, p. 29.

⁴³ Liu Andong, Zhang Li, Yan Guoyou, and Li Kaiqiang, “What Is the Real Meaning of the ‘Golden Helmet?’ Air Force Organizes Fighter Aviation Unit Competition-Oriented Air Combat Confrontation Evaluation Third Year in a Row,” *Kongjun Bao*, January 6, 2014.

⁴⁴ Liu Andong et al., 2014.

The judges' decisions were reportedly based on "real-time digital assessments," and pilots focused on sharpening their skills by analyzing "air combat data." PLA media reports emphasized the importance of analyzing equipment performance and pilot skill. According to one Golden Helmet winner, Yan Feng, a pilot with a regiment subordinate to the Nanjing MRAF,

in ace contests, victory appears to be [determined] in the air, but the decisive battle is actually on the ground. When you profoundly understand your opponent's equipment, thinking, habits, and character, the outcome of victory or defeat is already apparent when it comes time to cross swords.⁴⁵

Golden Helmet 2014 and Golden Dart 2014

The fourth Golden Helmet competition was held over approximately ten days in September 2014. It is not clear why the PLAAF held the 2014 competition two months earlier than in previous years, but immediately following the Golden Helmet competition in 2014, the PLAAF held its first Golden Dart (金飞镖) competition. This may explain why the Golden Helmet competition was moved forward to September instead of being held in November as it was in previous years. The 2014 Golden Helmet competition reportedly involved a number of types of aircraft, including J-10, J-11, and Su-30 fighters, and featured "one-on-one" as well as "team-against-team" engagements.⁴⁶ The number of pilots participating in the competition increased from 128 to 170, including 83 who had not competed before, and the number of regiments and brigades increased to 19. One of the potentially important new developments in 2014 was that the pilots selected for the competition were selected at random by PLAAF Headquarters, not by the individual units. While it could be argued that this means China cannot be sure the winners actually represent its best pilots, it appears the purpose was to ensure that the pilots did not merely "train for the test" during the rest of the year to improve their chances of winning, an approach that could detract from other training objectives and potentially tilt the competition in favor of the pilots who spent the most time preparing specifically for the event rather than the most highly skilled entrants. Approximately 100 aircraft were deployed for the competition.

The competing pilots came from 19 aviation brigades and regiments from all seven military regions (MRs),⁴⁷ including three units that had not previously participated in the competition. Six pilots won Golden Helmet awards (down from nine the previous year), five air regiments were assessed as superior air combat units, and seven pilots were assessed as "outstanding air combat pilots."⁴⁸ Yu Hejie, deputy director of the PLAAF Headquarters Department's Military Training Department, highlighted the fact that, even as the number of entrants increased, the number of

⁴⁵ Liu Andong et al., 2014.

⁴⁶ "PLA Pilots Vie for Coveted 'Golden Helmet' in Largest Ever Air Drills," 2014.

⁴⁷ Some PLA media reports state 19 and others 20.

⁴⁸ "Six Pilots Win 'Golden Helmet,'" [6 名飞行员赢得"金头盔"], *Kongjun Bao*, September 22, 2014.

awards was reduced, making it even more difficult to win a Golden Helmet award than in past competitions.⁴⁹

One PLAAF media report stated that, along with the PLAAF's progress in making training more realistic, the Golden Helmet competition has become an effective platform for training and testing the combat capabilities of PLAAF fighter units. The same report noted that the 2014 competition featured "two-versus-two" engagements. Taiwan media reports indicated that the competition involved BVR, medium-range, and short-range combat; it also reportedly incorporated electronic warfare.⁵⁰ In addition, the PLAAF media report emphasized the competition's role in the "training and development of young pilots," and highlighted the outstanding performance of a younger fighter pilot (Li Haiming, a pilot who was born in 1985 and serves with a regiment from the Jinan MRAF) who coordinated closely with his wingman, evaded his opponent's missile attacks, and scored a number of missile hits, thus impressing older pilots (including two-time Golden Helmet winner Xu Liqiang, a deputy brigade commander from the Shenyang MRAF).⁵¹

Immediately following the Golden Helmet competition in 2014, the PLAAF held the inaugural Golden Dart competition. The units included bomber and attack units as compared with only fighter units for the Golden Helmet competition. PLA media reports have offered few specifics about the content of the Golden Dart event, except that it focused on ground attack, in contrast to the air-to-air focus of the Golden Helmet competition.⁵² In the end, 12 aircrews out of about 300 total personnel were selected as winners.

Golden Helmet 2015

The PLAAF's 2015 Golden Helmet training exercise took place November 15 to December 6 in China's northwest desert, according to Chinese state-run media.⁵³ The exercise included 162 pilots from more than 20 PLAAF units competing in two-on-two "free air combat." The pilots flew a combination of J-11, J-11B, Su-30, J-10A, J-7 and J-8 fighter planes. In 2015, 12 pilots won the Golden Helmet, representing just more than 7 percent of the participants.⁵⁴ Official

⁴⁹ "New Round of 'Gold Helmet' Air Battle Contest of PLAAF Kicks Off," *China Military Online*, September 15, 2014.

⁵⁰ "PLA Pilots Vie for Coveted 'Golden Helmet' in Largest Ever Air Drills," 2014.

⁵¹ See Zhou Meng, Liu Yiwei, and Zhang Li, "Difficulty Level for New Air Force 'Golden Helmets' Doubles in Air Combat Skills Competition," *Zhongguo Kongjun Wang*, September 12, 2014.

⁵² See, for example, "Air Force Organizes Penetration and Assault Competition Assessment for Blue Sky Warriors to Achieve the 'Golden Dart' Award" ["空军组织突防突击竞赛性考核练硬功 蓝天勇士争当'金飞镖'"], *Chinamil.com*, October 5, 2014.

⁵³ "Air Force Held Golden Helmet 2015 Competition" ["空军展开 2015 年度金头盔比武竞赛"], China Central Television (CCTV), December 5, 2015.

⁵⁴ "Golden Helmet Looks to the Future, Every Year Is More Like Real Combat" ("头盔着眼未来 实战化程度年年递增"), *Shenzhen TV*, December 5, 2015.

media reports indicate that PLA Naval Aviation pilots participated in the Golden Helmet competition for the first time in 2015, marking an important step forward in joint “free air combat” training.⁵⁵

Assessing the Golden Helmet Competition

Recent articles in PLA media provide a good overview of how the competitions have advanced over the four-year period to include competition between different types of aircraft, “two-on-two” as well as “one-on-one” confrontations, and a mix of younger and older competitors. We judge that the emphasis on younger participants in the competition, many in their late 20s or early 30s, reflects a desire on the part of the PLAAF to develop fighter pilots who are less bound to traditional methods and more willing to implement the “free air combat” approach.⁵⁶ Selection of some participants at random also allows PLAAF leaders a means to assess the quality of average pilots relative to their elite counterparts. Additionally, to more closely approximate realistic combat conditions, the PLAAF is relaxing safety restrictions, such as closing the gap between aircraft to 50 meters and adjusting the altitude for engagement, even though these changes entail higher risk of an accident.

Chinese military media reports indicate that the competition has drawn attention to the importance of equipment issues as well as enhancing air-combat tactics. For example, according to one report,

since the first Golden Helmet competition, Chinese air force units have paid more attention to electronic countermeasures and weapons operations, and enhanced exchanges with industrial and manufacturing institutions.⁵⁷

According to Chinese military media reports, pilots train during the year to improve their chances of winning the individual and group competitions. One report highlighted a regiment from the Shenyang MRAF that was unsuccessful in the 2011 competition, but spent the next year training and evaluating video and flight parameters collected during training to analyze problems and sharpen their skills, which enabled them to win a group award in the 2012 competition.⁵⁸ Notably, however, this could suggest that they “trained for the test” throughout the year.

⁵⁵ Sun Yu [孙瑜] and Wang Zhengyang [王正杨], “‘Fierce Dragons’ Fight Against ‘Golden Helmets’ [“猛龙”摩战“金头盔”],” *Renmin Haijun* [人民海军], January 6, 2016, p. 1.

⁵⁶ The PLAAF does not release official numbers on the demographic characteristics of its pilots or the average number of hours they fly per year, nor does it release such information about participants in the Golden Helmet competition. Rough calculations suggest, however, that the average age for Golden Helmet participants is between 28 and 34, and the average number of hours probably ranges from about 1,500 to 2,100. Chinese media reports suggest that some pilots get more hours than others, and that some of the most experienced pilots may get additional hours to “train for the test.”

⁵⁷ Xu Tongxuan, 2013, p. 30.

⁵⁸ Yu Hongchun, “The Golden Helmets: Cultivating Excellence,” *China Armed Forces* [中国军队], Vol. 19, No. 1, February 28, 2013, pp. 40–41 (Chinese version of article on pp. 38–39).

During the Golden Helmet competition, there are self-evaluations and peer evaluations after each round. According to one report: “When each air battle concluded, the [unit] commanders led their pilots in seeking advice from their opponents and analyzed their maneuvers repeatedly.”⁵⁹ In addition, a panel comprising experts, including senior air force officers and professors, employ a similar approach to judge the results. Their analysis is based on information collected by an operational data-recording system that Chinese media reports describe as similar to evaluation systems used by the U.S. military.⁶⁰

Clearly the PLAAF sees the Golden Helmet contest as having training value. Describing the 2012 competition, Jiang Jinming, the head of the PLAAF Military Training Department, said, “we organize the competition to stimulate combat effectiveness rather than simply evaluating the scores.”⁶¹ Comments from PLAAF pilots also suggest that the competition has considerable training value. For example, one participant in the 2012 competition stated, “The most important thing is not the result, but the process. I have learned more in a day of confrontation in the air than in a year of flight training.”⁶²

PLA media reports indicate that Golden Helmet winners sometimes play a role in training less experienced pilots, although this role appears to be different from that of a weapons instructor—course graduate in the United States. For example, a profile of Jiang Jiaji, the first two-time winner of the Golden Helmet award (2011 and 2012), states that, in 2013, he was appointed chief of staff (e.g., director of the Headquarters Department) of a regiment based in Chengdu, and that his duties in that position focused on instructing pilots who were transitioning to a different type of fighter aircraft.⁶³ Similarly, a March 2014 report on fighter-pilot training in the Shenyang MRAF states that, in air-to-air confrontation training, several pilots who were given the Golden Helmet award were specially selected to simulate the blue force and take on a

⁵⁹ Yu Hongchun, 2013, pp. 40–41.

⁶⁰ PLA media reports indicate that the PLAAF is using the *feican* system for evaluation. The Flight Parameter Recording System (飞行参数记录系统 / 飞参控制系统), which is abbreviated as *feican* (飞参), is receiving more attention. When combined with the Expert Evaluation System of the ground processing station, it acts as an integrated monitoring system that measures, records, and processes the working status and parameters of the aircraft and its systems. When an aircraft is in flight, the flight parameters are dynamic. Once the flight ends, these dynamic parameters disappear. With the *feican* installed on the aircraft, it can collect and preserve more than 70 sets of key parameters such as flight control, engine status, flight status, and instrument indicators. The Real-Time Flight Monitor System (飞行实时监控系统), which is developed on the basis of the *feican*, can accurately transmit flight-parameter information and satellite-navigation positioning information for a single or multiple aircraft within the beyond-visual range to the control tower on a real-time basis, where the information is displayed on the terminal. At the end of each flying day, the unit displays information from the *feican* system on a screen to conduct an evaluation. Xue Wenhai and Wang Gang, “Clicking on the Battlefield in the Air,” *China Air Force (Zhongguo Kongjun)* magazine, No. 4, 2005, p. 36–37.

⁶¹ Yu Hongchun, 2013, pp. 40–41.

⁶² Yu Hongchun, 2013, pp. 40–41.

⁶³ Hu Xiaoyu, “The Secret Behind the Golden Helmet,” [“金头盔的秘密”], *China Armed Forces*, Vol. 25, No. 1, 2014, pp. 28–29 (Chinese version, pp. 26–27). Also of note, in the PLAAF, all pilots must serve as a flight instructor in their unit for a certain number of hours in order to be moved up from a Grade-3 to Grade-2 to Grade-1 and Special Grade pilot, which are noted by flight wings they wear.

red force that comprising less experienced PLAAF fighter pilots.⁶⁴ Former Golden Helmet winners used electronic-warfare techniques to quickly defeat the red force pilots, but the red force pilots gained valuable experience. After the event, all participating personnel gathered for a review and discussion of combat footage.

⁶⁴ Rather than use PLAAF tactics and combat methods, the J-10 blue force unit in Cangzhou at least theoretically is using real enemy tactics, but it is unclear from available open-source reports how they learn them or how effectively they replicate the tactics of potential adversaries.

4. The PLAAF Participation in Aviadarts and Bayi Aerobatics Team Participation in International Air Shows

This section addresses the PLAAF's participation in Russia's Aviadarts-2014 international military aviation competition. It begins with a brief overview of Aviadarts and then evaluates the participation of PLAAF fighter aircraft in the competition.

The PLAAF Participation in Aviadarts

The Aviadarts competition is held in Russia and was initiated in 2013 as a competition open only to Russian pilots. Certain components of Aviadarts were open to international participation for the first time in 2014, when pilots from China and Belarus competed with their Russian counterparts in the second part of Aviadarts, following an initial part that was not open to international participants.⁶⁵ With the addition of the second part that was open to international participation, Russia appears to use the Aviadarts events not only to hone the skills of its pilots and strengthen relations with their foreign counterparts, including the Chinese participants, but also to showcase improvements in Russian equipment and capabilities to an international audience.⁶⁶

In the fighter-pilot portion of the competition held in Lipetsk, pilots compete in a number of areas, such as navigation, reconnaissance, aerobatics, and air-to-ground attack.⁶⁷ During the ground-attack portion of the competition, the fighter jets employ unguided ordnance because the Russian judges consider this to be the best test of the skills of participating pilots.

The three PLAAF Su-30MKK Flankers that traveled to Aviadarts 2014 in Lipetsk came from the PLAAF Cangzhou Test and Training Base. Chinese media reports the PLAAF participated in

⁶⁵ Additionally, military attaches from more than 30 countries were invited to observe parts of the competition. See "Military Attaches of 33 Countries to Watch Aviadarts 2014 final stage," Interfax, July 24, 2014.

⁶⁶ For an article that describes Aviadarts more generally, see Thomas Newdick, "Russia Brings Together Some of the World's Best Fighter Pilots: Aviadarts is Moscow's Top Gun," *War Is Boring*, August 11, 2014. Also of note is that PLA ground forces from the Nanjing MR's 1st Group Army participated for the first time in the Tank Biathlon competition in Russia in August 2014. Russia was crowned the winner in the final round during a face-off against Armenia (second), China (third), and Kazakhstan (fourth). See, "Chinese Military Exercises Create Records in 2014," *China Military Online*, December 17, 2014; Li Yan, "Chinese Tanks Appear in International Tank Competition," *China Military Online*, August 5, 2014; and Guo Renjie, ed., "Made-in-China Armored Equipment Debuts in 'Tank Biathlon-2014,'" *China Military Online*, October 23, 2014.

⁶⁷ The Russia-only part of Aviadarts 2014 incorporated a number of different types of aircraft, including bombers and transports.

the competition with the approval of the Central Military Commission.⁶⁸ According to one international report,

The Chinese jets apparently operated as a two-ship formation and undertook formation flying and navigation, reconnaissance, complex aerobatics and finally air-to-ground sorties using unguided rocket projectiles.⁶⁹

Russian pilots won first place in the competition, but a senior Russian defense official praised the PLAAF's participation, stating, "The Chinese pilots have demonstrated outstanding professionalism and superb training level, which is very impressive."⁷⁰ Each of the Chinese pilots won a Hyundai car for their participation in the competition.

In August 2015, three PLAAF JH-7s competed in Aviadarts, which was held within the framework of the International Army Games 2015 and occupied three airfields located in Ryazan, Bryansk, and Kaluga.⁷¹ More than 100 pilots in more than 50 flight crews from Russia, Belarus, Kazakhstan, and China flew 12 different types of fixed-wing warplanes and helicopters, including Chinese-made JH-7 fighter-bomber and Russian-made Su-24M and Su-34 frontline bombers; Su-25 strike aircraft; Su-27, Su-30SM, and MIG-29SMT fighters; IL-76 military transport planes; Tu-22M3 long-range bombers; and Ka-52, Mi-35 and Mi-8 helicopters. Although China took second place out of ten teams in the overall International Army Games, the PLAAF came in third behind Russia and Kazakhstan but beat Belarus for a second time in the Aviadarts competitions. Unlike in 2014, when the PLAAF Su-30s used Russian munitions, the JH-7s brought their own munitions.

PLAAF participation in the Aviadarts competition represents an opportunity for China to strengthen its foreign military relationships. An official Chinese military media report stated that the PLAAF participated in Aviadarts to facilitate "the pragmatic cooperation between the air forces of China and Russia in [the] military training field."⁷² The PLAAF spokesperson highlighted the PLAAF's intent to "use this international competition as a multilateral platform to strengthen exchange of experience with the flight personnel from various participating countries." Additionally, PLAAF involvement in Aviadarts "provided an important platform" for PLAAF pilots to learn from their Russian counterparts, according to one PLAAF officer who took part in the competition.⁷³ In addition, the PLAAF's participation in Aviadarts appears to

⁶⁸ Yao Jianing, "Chinese Air Force Attends 'Aviadarts-2014' International Pilot Competition in Russia," *China Military Online*, July 21, 2014.

⁶⁹ Newdick, 2014.

⁷⁰ For an article that describes Aviadarts more generally, see Newdick, 2014.

⁷¹ Hua Xueyu, ed., "Chinese Military Transport Planes Carry Ammunitions to Russia for Int'l Games," *China Military Online*, July 30, 2015; "Highlights of Aviadarts 2015 in Russia," *Guangming Online*, August 11, 2015.

⁷² Yao Jianing, 2014. The report also stated that military cooperation between China and Russia "is not targeted at any third party."

⁷³ Zhang Tao, ed., "'Aviadarts 2014' International Pilot Competition Ends," *China Military Online*, July 29, 2014.

align with a desire to project an image of a more open and confident PLAAF to domestic and international observers. As the PLAAF spokesperson put it, the PLAAF is

a strategic military service, and will go abroad more frequently to learn from the air forces of powerful nations and to enhance its ability to perform diversified military missions in a broader space.⁷⁴

Bayi Aerobatics Team Participation in International Air Shows

The pilots who belong to the PLAAF's Bayi Aerobatics Team (八一飞行表演队) are also *elite pilots*, according to Chinese media reports.⁷⁵ Although the acrobatic skill set does not always translate to tactical prowess in the combat arena,⁷⁶ the members of the Bayi team appear to be some of China's most experienced fighter pilots. The Bayi Aerobatics Team has been flying J-10s for about five years, having previously flown older fighters. According to one report, the basic mission of an air force aerobatics team is

to give full play to their aircraft's performance, showcase the excellent flight skills of their pilots, and expand and deepen the exchanges and cooperation among air forces of different countries through their aerobatics performance.⁷⁷

Since the Bayi Aerobatics Team's founding in January 1962, its pilots have performed frequently within China as part of this broader mission, including numerous demonstrations for foreign delegations and at important events such as the Zhuhai Air Show and China's 40th, 50th, and 60th National Day parades, where it flew over Tiananmen Square in Beijing.⁷⁸ It is only more recently, however, that the team has begun to perform overseas.

The Bayi Aerobatics Team has participated in two international air shows outside of China in recent years. The Bayi Aerobatics Team's first performance at an overseas event was at the 2013 Moscow Air Show. Its second was in March 2015, at the Langkawi International Maritime and Aerospace Exhibition in Malaysia. The PLAAF sent seven J-10 fighters as well as two IL-76 transport aircraft responsible for carrying the team's equipment, supplies, and members of its support crew. According to a PLA media report, the PLAAF aircraft departed from a PLAAF base in southwest China on March 11, 2015, after which they made a stopover in Thailand for refueling before their arrival at Langkawi Airport in Malaysia, where they performed in the air

⁷⁴ Yao Jianing, 2014.

⁷⁵ "First Flight by Female Pilots of the Bayi Aerobatics Team" ["八一飞行表演队女飞行员首曝光.一飞行"], *Huanqiu Wang*, September 16, 2014.

⁷⁶ The authors wish to thank one of the reviewers for raising this point.

⁷⁷ See Guo Renjie, ed., "PLAAF Aerobatic Team Arrives in Malaysia for Stunt Shows," *China Military Online*, March 12, 2015.

⁷⁸ Liu Feng'an, "Mid-Air Acrobatics," *Beijing Review*, No. 38, September 22, 2011.

show from March 17 to 21.⁷⁹ Chinese media reports noted that four women pilots participated in the event, which made it the first time the PLAAF sent women pilots to perform overseas.⁸⁰

Additionally, following its four “air ballet” performances at the Langkawi Air Show, the Bayi Aerobatics Team stopped at Don Mueang Royal Thai Air Force Base in Thailand again en route back to China for a military exchange program, arriving in Thailand on March 23, 2015. Seven of the Bayi Aerobatics Team’s J-10s and one IL-76 transport flew alongside two Royal Thai Air Force Gripen fighter jets as part of a welcoming ceremony prior to conducting public demonstrations.⁸¹ One international media report noted that this military engagement event highlighted the Bayi Team’s “critical and visible role as part of China’s military diplomacy.”⁸² In addition to the welcoming ceremony and demonstrations, the event featured a meeting between PLAAF Major General Feng Aiwang, deputy chief of staff of the Beijing MRAF and commanding officer of the Bayi Aerobatics Team, and a senior Royal Thai Air Force officer. PLA media and the People’s Republic of China’s Ministry of National Defense website published a number of photos from this stopover, emphasizing China’s growing military ties with Thailand.⁸³

These international performances and exchanges have provided the PLAAF an opportunity to showcase their pilots and their abilities; these events have also given the PLAAF opportunities to showcase its improving capabilities and professionalism. While the PLAAF does not appear to make public information such as requirements for tryouts, training, or career-pipeline options, PLA media reports have revealed some information on the team’s members. For example, Chinese reports indicate that female PLAAF pilots who have been selected as Bayi pilots have averaged 800 hours. Starting with the 8th Group of female aviators, they are now flying the J-11, J-10, and JH-7 third-generation aircraft.⁸⁴ Similar statistics are provided in multiple sources for the female pilots, but there is no information available as to historic or current standards for the unit’s pilots in general. Chinese media reports note, however, that the unit

selects pilots according to incredibly strict criteria, with most of the members having accumulated more than 1,000 flying hours and being above the first-grade level.⁸⁵ These high standards mean that only the best pilots in China can make it

⁷⁹ See Guo Renjie, 2015.

⁸⁰ See “中国首批歼击机女飞行员驾歼-10 海外首秀,” *Xinhua*, March 17, 2015.

⁸¹ Jeffrey Lin and P. W. Singer, “Chinese Fighter Jets Fly South for Spring Break,” *Popular Science*, March 25, 2015.

⁸² Lin and Singer, 2015.

⁸³ Guo Renjie, “PLAAF Aerobatics Team Stops over in Thailand,” *China Military Online*, March 25, 2015.

⁸⁴ Kenneth Allen and Emma Kelly, “China’s Air Force Female Aviators: Sixty Years of Excellence (1952–2012),” *China Brief*, Vol 12, No. 12, June 22, 2012.

⁸⁵ In 1986, the PLAAF began awarding one of four aeronautical ratings to all aircraft crew members, including pilots, navigators, communications personnel, gunnery personnel, and instructor pilots. The PLAAF also began awarding aircrew ratings to navigators, communications and gunnery personnel, and instructor pilots. The PLAAF has not published figures on the number of pilots in each grade. The four grades are as follows: special grade (特级);

on to the team. The Bayi team's performance at the Zhuhai air show was a rare chance for the four female pilots to take the limelight, as they are only second-grade pilots, with, on average, 800 flying hours under their belts.⁸⁶

This suggests that the unit would likely have some of China's most experienced pilots, although it should be noted that their training centers on aerobatics rather than tactics.

first grade (一级); second grade (二级); and third grade (三级). The criteria for acquiring these grades include time on station, flying hours, special missions, and ability to fly in daytime and nighttime and under instrument flight rules (IFR) and visual flight rules conditions. After graduating from a transition base, pilots can be awarded a third-grade rating if they have achieved the required technical level. Two to three years after being assigned to an operational unit, they can be awarded a second-grade rating by flying under day and night IFR conditions, maintaining flight safety standards, and reaching a certain proficiency level. Next, they can become first-grade pilots if they have conducted combat and training missions under day and night IFR conditions; flown a certain number of hours; reached the levels of instructor pilot, flight leader, and flight commander in the tower; and maintained flight safety standards. Finally, they can become special-grade pilots if they have already been approved as first-grade pilots; made special achievements in combat, training, and test flights; and maintained flight safety standards. See National Air and Space Intelligence Center, 2010, p. 81.

⁸⁶ "PLA Female Pilots Aspire to Become China's Next Generation of Astronauts," *Global Times*, November 23, 2014.

5. Conclusion and Questions for Future Research

This paper reviewed the airmen the PLAAF designates as *elite pilots*. The PLAAF has identified at least three groups of aviators as *elite pilots*: (1) winners of the annual Golden Helmet competition, which began in 2011; (2) pilots who participated in the Aviadarts international military aviation competition in 2014; and (3) members of the PLAAF's Bayi Aerobatics Team. The PLAAF's emphasis on the development of fighter "tactics" and "combat methods" and its approach to developing these three groups of *elite pilots* signifies its determination to pursue further professionalization and enhance the competence of its pilots, which it appears to see as no less important than the modernization of its aircraft, weapons, and equipment. The implications for the PLAAF's overall operational capability are less clear, however, and should be the subject of future research as the PLAAF continues to refine its "tactics" and "combat methods" and to cultivate its *elite pilots*.

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This report draws on a wide variety of Chinese primary sources to provide an overview of how the Chinese People's Liberation Army Air Force (PLAAF) selects and trains what it calls its elite fighter pilots. One of the most important lessons learned has been the PLAAF's desire to move toward less scripted training.



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